UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE
Summary Review of Monthly Reports*
for
SOIL CONSERVATION SERVICE RESEARCH**
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EROSION CONTROL PRACTICES DIVISION

The Effect of Crop Rotations on Soil Aggregation - F. W. Schaller, Ames, Iowa.-"An aggregation study has been made on the crop rotation plots at the Howard County Experimental Farm. The plots were established in 1945 and are located on Carrington soil (plastic till phase). The plots were sampled May 19 and June 17, 1950. A highly significant difference in aggregation was found between the five rotations on all first-year corn plots and between the first- and second-year corn plots. There was no significant difference between the corn yields on these plots. A summary of the aggregation data is presented in the following table.

The effect of crop rotations on soil aggregation, Howard County Experimental Farm, 1950.

Rotation	Mean weight-diameter (mm)* First-yr. corn	Second-yr. corn
C-C-O-M	0.70	0.60
C-O	0.72	-
C-O-M	0.87	-
C-C-O-M-M	0.91	0.63
C-O-M-M	0.99	-

* Highly significant difference among first-year corn plots and also first- and second-year corn plots."

The effect of Contour Planting on Yields of Crops - E. L. Sauer, Urbana, Illinois.-"Contouring, contour strip cropping, grass waterways, and terracing are among the most popular and wisely used mechanical conservation practices. To measure the effects of these practices, yields of crops grown on the contour, in contour strips, or on terraced fields on the contour were compared with those of the same crops grown on the same farms up and down hill or in the usual field pattern. Insofar as possible this comparison eliminated differences in management and in practices other than contouring. Yield results for a 7-year period are summarized in Table 1.

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** All research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.

Table 1.--Yield Increases for crops grown on the contour compared with farming up and down the slope on the same Illinois Farms (7-year average, 1939-45)

Crop	No. of farms	Increases from contouring			
		Percent	Bushels per acre	Value of yield increase at 1950 Illinois farm prices	
Corn	124	12	6.9	($1.35 per bu.)	$9.30
Soybeans	48	13	2.7	($2.49 per bu.)	6.72
Oats	46	16	6.9	($0.76 per bu.)	5.24
Wheat	40	17	3.4	($2.02 per bu.)	6.87

Costs of Farming on the Contour - E. L. Sauer, Urbana, Illinois.- "The effect of contour farming on total farm operating costs was studied on 270 Illinois accounting farms for the four years 1940-43. Farms on which all or most of the farming operations were on the contour were matched with comparable farms which followed a similar pattern of farming but on which few if any field operations were on the contour. This study indicates no significant difference in total expense for labor, power, and machinery between farms operating on the contour and those not on the contour (table 2). The difference in expenses favored contour farming.

Table 2.--Man labor costs and power and machinery costs per crop acre on 135 contour-tilled farms compared with 135 farms not contour-tilled (four-year average, 1940-43, costs adjusted to 1950 price level)

Item	Contour-tilled farms	Not-contour-tilled farms
Man labor costs	$19.82	$21.31
Power and machinery costs	13.20	13.84
Total	33.02	35.15
Difference in favor of contour operation	2.13	

Animal Gains Greatly Increased by Percentage of Kudzu in Pastures - R. M. Smith, Rio Piedras, Puerto Rico.-"Mr. Caro is weighing animals and checking pasture species relationships at Orocovis to round out a full year of grazing results. The table below shows a very interesting relationship between animal gains per acre and the percentage kudzu of individual pastures. On native pasture with no kudzu the animals showed practically no gain at all for a period of about 2 months. Mere maintenance is about all that the poor native pastures supply. We think it would be premature to claim that pastures in this area with 50% or more of kudzu could be generally depended upon to produce 700 pounds or more of beef per acre, as suggested by these early results but, at least, our overall average of 450 pounds per acre per year with native animals appears conservative, as the experiment starts its second year. Differences in kudzu percentage completely overshadow any effect of variable land slope. Highest producing pastures 4 and 5 are definitely steeper than pastures 1 and 2, which are low in kudzu and have given low beef gains.

Animal gains shown in relation to kudzu percentage of individual pastures at Orocovis.

	Results for Eleven Years			
	Molasses Grass	Kudzu	Other	Production per acre (lbs.)
Pasture 1	83%	8%	9%	302
" 2	84%	7%	9%	213
" 3	66%	27%	7%	414
" 4	58%	30%	12%	545
" 5	50%	35%	15%	666

Greenbugs Then Hail - Experimental Crops Destroyed - A. E. Lowe, Garden City, Kansas.-"The outstanding weather phenomenon of the month was an extremely heavy hail which fell about 1:15 a.m. the morning of May 30th. Total precipitation in this storm was 1.48 inches. It caused complete loss of all wheat, barley, oats, spring wheat, flax and safflower on the station. Hail about the size of golf balls not only ruined the crops but broke many window panes in buildings and damaged roofs. This is the first time in fourteen crop years that this station has had a serious hail loss. The hail completely destroyed the wheat that had survived the winter.

"The barley and oats that were so badly damaged by greenbugs were making rapid recovery and were heading when destroyed by hail."

Effects of Barriers on Airflow - A. W. Zingg, Manhattan, Kansas.- "The study of the effects of barriers on airflow was continued. Past evaluations of the effect of barriers have been made by considering only the horizontal wind velocity and the reductions made therein. It appears that objects may so change the stream line pattern of air flow that measurements of the horizontal velocity alone give misleading results."

The Effect of Treatments on Stability of Soil Structure - F. L. Duley, Lincoln, Nebraska.-"In 1944 T. M. McCalla set 26-inch cylinders in the ground and filled these with Peorian loess. This was the subsoil of the loessial depostis near the Missouri River. This is almost devoid of organic matter. Certain treatments were applied to these duplicate cylinders. The effect of the treatments of the stability of the soil structure has been determined after seven years. The tests were made by comparing the number of water drops required to disintegrate small clods of 0.15 gram taken from the surface inch of soil. The results are shown in the following table.

Soil Treatment	No. water drops to disintegrate .15 gm lump of soil
Soil material - untreated	3.9
Soil in cylinder - untreated but had much moss growth on surface	51.9
Mulched, 3 tons straw annually	14.7
3 tons straw annually - mixed in soil	35.2
Planted to red clover	27.3
Planted to alfalfa and brome	65.9
Planted to bluegrass	63.8

Bahia Grass in Alabama - E. C. Richardson, Auburn, Alabama.-"The week of May 7 to May 11 was spent with Mr. Bailey and Mr. Cooper. During this period, we went over the SCS work located here at Auburn, visited the Thorsby nursery, the Black Belt Substation, and several farms in South Alabama.

"At the nursery we observed reseeding crimson clover growing in combination with Bahia grass. The Bahia sod was very thick. In the fall of 1950 the Bahia sod was mowed, and the clippings were left on the land. In the area where the divider board parted the swath, an excellent stand of crimson clover was present. In the other areas where the Bahia clippings were left as they fell, there was almost no clover present. The heavy growth of grass apparently smothered the clover seedlings. The removal of the heavy Bahia sod by mowing or grazing appears to be essential for obtaining a volunteer stand of crimson clover.

"In another area on the nursery farm, Bahia grass was being used in rotation with corn and winter legumes. The heavy grass stubble plowed under was beneficial to the growth of both corn and winter legumes.

"In South Alabama several plantings of Bahia grass were observed; probably the best planting observed was a 42-acre field growing in combination with crimson clover near Geneva, Alabama. Both clover and grass seed were harvested from this field."

Soil and Water Loss - Rainfall Intensity - Crops - Geo. Sparrow, Tifton, Ga.-"One rain occurred during May which resulted in measurable loss of soil and water. On May 10 a rainfall of 0.90 inch occurred, with a maximum intensity of 2.08 inches per hour over a 20 minute period. That rain, however, caused practically no soil or water loss. It was on the following day, May 11, that appreciable loss occurred. The rainfall on that day was 0.72 inch, or less than that of the previous day. Maximum intensity, however, was 2.80 inches per hour over a 15 minute period.

"Plot cover and condition were as follows: 8 plots with Spanish peanuts in an early stage of growth, 4 plots with corn in an early stage of growth, 3 plots in oats which was reaching maturity, 2 plots in a partial sod of Coastal Bermuda grass with Crimson clover, and 1 plot with a sparse mixture of weeds, grass and immature oats (miscellaneous cover).

"Soil losses were heaviest from peanut plots, with losses from other plots in the following descending order: miscellaneous cover, corn, oats, Bermuda grass. Water loss was heaviest from the plot with miscellaneous cover, with oats plots coming next. Loss of water from other plots in descending order were: peanuts, corn, Bermuda grass."

Contour vs. Up and Down Hill - G. R. Free, Marcellus, New York.-"In past monthly reports we have called attention to yield differences in 1950 of 22% for cabbage and 24% for corn on plots that had been under a 3-year rotation including 1 year of sod since 1942. These yield differences were due to the differences in soil and water losses that have occurred with contour and up and down hill operations. These plots are on well drained and moderately sloping Honeoye silt loam, land capability class III.

"The plots and the colluvial fans in the sod below the plots were sampled last fall by Mr. Bhagat, a graduate student in the Cornell Agronomy Department working under the direction of Professor Zwerman. Mr. Bhagat reported that the volume of colluvium below the up and down hill plots indicated a total soil loss from these plots of 110 tons per acre or about 12 tons per acre per year. There was only a trace below the contour plots. The surface soil of the up and down hill plots was more compact (volume weights of 1.23 and 1.13 for the 0-3" depths of the up and down hill and the contour plots respectively). It contained less organic matter (3.66% compared to 3.88%), and the stability of aggregates was slightly less. Available phosphorous, potassium, and calcium was determined, but the differences were not great nor very consistent. Other chemical and pot tests of these soils are still underway."

Upland Pastures - B. H. Hendrickson, Watkinsville, Georgia.-"Of the four best producing upland pastures during the 12 month period ending February 28, 1951, three of them located on Class IV to Class VII land produced pasture cage clippings totaling between 4.40 and 4.80 tons per acre. Kudzu-fescue was highest in total forage, 1.00 ton per acre of which was grown between November 1st and February 28th, for winter grazing. Kudzu-rescue was a close second, with .95 ton per acre produced in winter. In third place in annual yield was the kudzu-ryegrass pasture, which produced but little grazing the past winter due to cold damage to the ryegrass seedlings. The fourth pasture, on Class III land, consists of the Bermuda grass-tall fescue-crimson clover combination with 4.28 tons per acre total yield of which .85 ton per acre supplied winter grazing. Winter-grazed Ky fescue seed fields also produced equally good winter grazing. The established stands of both the tall fescue and rescue perennial grasses withstood severe cold (4°F minimum) and made considerable forage growth during warm spells in winter.

"The above pastures regularly receive only nominal fertilizer applications each year of 500 pounds per acre 4-8-6, and some additional N. The indications are that increased rates of fertilization will prove profitable.

Texas Rescue Grass was Unsatisfactory in Georgia -B. H. Hendrickson.-"The Georgia climate apparently does not suit Texas No. 46 rescue grass, seed fields of which we plowed under and destroyed on account of serious smut and mildew infection. Chapel Hill Nursery-grown rescue grass made very good clean growth."

Results with 2,4-D on Thistle in Wheat - Torlief S. Aasheim, Bozeman, Montana.-"Cultivation and spraying in the chemical fallow project was completed on May 16. A heavy stand of Russian thistle was present and good control was obtained by the spray application which consisted of .6 lbs. of 2,4-D acid in the ester formulation per acre."

Soil Moisture in Relation to Land Treatment - T. S. Aasheim, Bozeman, Montana.-"Soil moisture samples were taken during the week of May 27. Soil moisture conditions were found to be excellent in fallow and good in stubble although stubble land was definitely not as wet as it was a year ago. The following table summarizes moisture samplings taken this spring, and also shows what the moisture conditions were on some of these treatments last fall.

Average percent of soil moisture to a depth of five feet in stubble and fallow land at Froid, Montana on May 27, 1951 and on October 11, 1950.

Treatment	Percent Soil Moisture	
	Fall 1950	Spring 1951
Stubble		
Fall bladed	11.1	12.4
Not fall bladed	11.4	12.5
Fallow		
Subtilled	14.7	14.8
Subtilled - fall chiseled	13.6	15.1
Chemical	15.2	14.7
Chemical - fall chiseled	14.1	14.9
Subtilled - bladed after harvest		15.3
Oneway		14.1
M. Bd. Plow		14.5

"These data support previous data which have indicated no advantage in blading stubble after harvest as far as moisture conservation is concerned. The moisture samples taken from fallow show only small differences and are probably within the range of sampling error. Plots which were sprayed and cultivated for weed control during 1950 contained as much soil moisture as plots which were cultivated each time some weed control operation was needed."

Mulch Experiment - T. L. Copley, Raleigh, N. C.-"Insect damage, with a resulting poor stand of corn, continues to plague our Surface Mulch Experiment. This has been a major trouble almost every year of the experiment. The vegetative growth of winter cover was particularly heavy this spring and was enough to present difficulties in land preparation. All of the residue could not be completely covered in the turn plots, and a considerable amount is present on or near the surface. The rye vetch combination does not appear satisfactory for the mulch balk method. Vetch continues to grow after corn is planted and seriously interferes with cultivation. Rye in the mulch-balk treatment seems to be working well with tobacco; however, as early growth of tobacco under this treatment is quite satisfactory it looks as well as with any other treatment.

Cover Crop Yields from Tobacco Rotation Plots - Winter cover crop yields from 1-year rotation plots were determined by Luke A. Forrest and are given in the table on the following page along with a few pertinent comments by him.

Cover crop yields, 1951, Average of four replicates, Tobacco Rotation and Residue Management Experiment

Cover Crop	Yield Plots (Tops only) Tons/Ac.	Runoff Plots (Roots & Tops) Tons/Ac.
Rye, nitrated, turned early 1/	1.45	2.32
Rye, turned early	1.31	-
Oats, nitrated, turned early	.74	-
Wheat, nitrated, turned early	1.00	-
Ryegrass, nitrated, turned early	1.09	2.07
Rye vetch, turned early (15 lbs. N. on tobacco)	1.54	-
Rye vetch, turned early (30 lbs. N. on tobacco)	1.68	-
Rye, nitrated, turned late	1.78	2.85
Rye-vetch, turned late	2.06	4.30
Rye, nitrated, mulch balk, turned early		2.13

1/ Early turning date was 3/21/51, and late turning date was 4/5/51.

"A delay of two weeks in the turning of rye gave an increased yield of approximately 20 percent from 2.32 to 2.85 tons per acre. The late turned rye-vetch yields were almost double that of the other crops. Late turned rye averaged slightly higher yields than the early turned.

"An application of 20 pounds of nitrogen per acre at seeding time did not materially affect the yields of early turned rye. Late turned rye-vetch gave the highest average yields, and early turned oats the lowest.

"Runoff and soil loss from tobacco, following these cover crops will be measured on the runoff plots to determine the conservation value of the cover crop residue.

Beef Cattle Demonstration Project - The small herd of white-faced cows continues to demonstrate how well such a project fits into a tobacco farming system. The last of the six calves of the 1950 crop were recently sold, and the sale of the six calves amounted to $1,000. One of the calves, purchased last fall by a local F.F.A. boy, took first place in the Wake County Baby Beef Show during May. Our herd continues to attract much attention from station visitors.

Article on Row Layout Prepared - An article entitled "Tobacco Rows by the String Method" was prepared for the American Society of Agronomy's magazine, "What's New in Crops and Soils", at the request of Mr. L. G. Monthey. Appropriate photographs, illustrating the method of row layout, were included. The manuscript was approved by the Director of Research of the North Carolina Agricultural Experiment Station and by the Washington Office."

Terrace Studies - C. J. Whitfield, Amarillo, Texas.-"The two terrace systems on Class III land handled runoff water very well during the heavy rains. Water drained out of the graded terraces within a short time after the rains stopped. The level closed end terraces held all of the water without any breakover. There was very little washing between terraces and it seemed that the rate of moisture penetration was rather rapid. Before the rains, the soil was dry, with a great number of wide cracks running some distance into the soil profile.

"The water also soaked in rather rapidly in the channels of the level closed end terraces. Both grassed waterways handled the runoff water with very little washing.

"The water spreader system on the grassland below the two terrace systems worked to perfection. Water was running through all the weep holes and was spread over the entire area. Excess water from the spreaders was slowly making its way over a wide area into the playa lake without any erosion whatsoever. Water from both waterways was being handled without any washing and allowing a maximum penetration of water into the soil.

Stubble Mulch - C. J. Whitfield.-"Rains totaling over six inches for the month of May tended to revive the wheat growing on the stubble mulch plots. Areas where greenbug damage was most severe, however, have not made normal development. Such areas now have flattened heads and a pronounced brittleness of the stems causing them to break easily between the nodes. A few greenbugs can be found hidden beneath the leaf sheaths, but none are visible externally.

"Forage samples clipped at the close of the month showed the wheat growing on the stubble mulched plots when compared to onewayed wheat to:

(1) Have a greater per-acre weight of foliage and of heads
(2) Have a better stand
(3) Have a larger head and greater weight of foliage per plant
(4) Be more advanced in maturity
(5) Have a lower ratio of weight of foliage to weight of head

Condition of wheat growing on stubble mulch plots, May 31, 1951 (All weights given are dry)

Tillage	Stand 1000's of plants per A.	Total weight of plants - Lbs. per A.	Ave. Weight of foliage Gsm.per plant	Ave. Wgt. per head Gms.	Ratio Wt.fol. Wt.heads
		Continuous Wheat			
Oneway	134.0	1172	2.94	.256	2.87
Subtillage	136.6	1392	3.33	.260	2.56
		Wheat-on-Fallow			
Oneway	151.5	1376	3.07	.235	2.90
Subtillage	163.5	2296	4.68	.304	2.47
Delayed subtillage	163.0	2213	4.36	.292	2.42

"The effect of the type of tillage used was much more pronounced on the wheat-on-fallow than the continuous wheat plots. The continuous wheat plots are abnormal in that no crop was harvested on them in 1950 due to drought and greenbugs."

Consideration of Needs for Combining Mechanical and Management Practices - O. R. Neal, New Brunswick, N. J.-"On May 15 a meeting was held at Marlboro to discuss the need for and possibilities of a field study combining good soil management conservation practices with mechanical conservation measures. The group consisted of John Lamb, Jr., Regional Research Representative; Messrs. Eley and Lloyd, Zone Conservationists; E. E. Evaul, Assistant State Conservationist; Neal Munch, District Conservationist; and Brill and myself.

"The need for such a study has long been evident. Data on amount and rate of runoff from areas under different rotation and cover cropping systems emphasize that need. The following excerpt from our 1950 Annual Report shows such information.

'Table 7. Intensity of rainfall and runoff during storm of July 16, 1950.

Crop - Tomatoes - 20" high covering 30% of soil surface
Soil Condition - Moist and firm
Rainfall - Amount - 3.50 inches
Duration - 22 hrs., 54 minutes
Maximum intensity - 3.33 ins./hr. for 11 minutes

Cropping System	Runoff	
	Amount inches	Maximum intensity inches per hour
1 (Continuous cultivation)	1.65	2.74 for 1 min.
2 (Sod 1 year in 3)	.44	2.00 for 1 min.
3 (Intensive cover cropping)	.80	2.00 for 1 min.
4 (Sod plus cover crop)	.40	1.70 for 1 min.

Duration of rates in minutes P = Rainfall R = Runoff

Cropping System	Intensity in inches per hour									
	0.00		0.25		0.50		1.00		2.00	
	P	R	P	R	P	R	P	R	P	R
1 (Continuous cultivation)	558	459	143	55	108	46	85	37	40	15
2 (Sod 1 year in 3)	558	476	143	37	108	28	85	16	40	1
3 (Intensive cover cropping)	558	453	143	42	108	38	85	24	40	1
4 (Sod plus cover crop)	558	467	143	40	108	32	85	19	40	0

'From the above data it is apparent that rotations and cover crops decrease the rate of runoff as well as the total amount.....however,.....for longer storms of high intensity the rate of runoff is not reduced in proportion to the total amount. This is an important point from the standpoint of an

effective conservation program. A major portion of the annual soil and water losses from a given area usually occur during a few of these intense storms. Maintenance of good physical soil conditions, by soil management practices, will reduce but not eliminate soil and water losses during such storms. Supporting mechanical practices are needed for further reductions in erosion losses. Conservation cropping systems which reduce the rate and amount of runoff from these major storms may reduce the complexity of supporting practices required but cannot eliminate the need for such support.'"

DRAINAGE AND WATER CONTROL DIVISION

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio.-"Rainfall of 2.41 inches for the month of May fell on 13 days. The greatest single day's rainfall was only 0.70 inch. Surface runoff was insignificant. Percolation of soil water to the ground water for the month totaled 0.55 inch. In the following tabulation it will be noted how percolation is diminishing as compared with previous months.

Table 1.--Monthly percolation of soil water to ground water

Month	Percolation
	Inches
Jan.	4.17
Feb.	3.61
Mar.	3.65
Apr.	2.47
May	.55

"On May 1, the percolation rate was 0.045 inch per day and on May 31, it was 0.006 inch per day. As the meadow grass and legumes on these lysimeters continued to use more and more water, there was less and less available for percolation.

"Mr. Dreibelbis reports that nitrate applied to bluegrass lysimeter Y101C on March 9 appeared in increased concentration of nitrates in percolation at the 8-foot depth about 50 days later--April 29. Prior to April 29 the concentration of nitrates was about 0.03 mgm per liter. On April 30 it was about 0.15. On May 11, it had reached a peak of nearly 0.20. Percolation rate on March 9 was 0.15 inch per day and on May 11, 0.04 inch per day. This indicates that some of the early-spring applications of nitrate fertilizer may be lost in leaching. Had this fertilizer been applied nearer the end of the percolation period it is likely that there would have been less lost."

Hydrologic Studies - R. W. Baird, Blackslands Experimental Watershed, Waco, Texas.-"For the month of May rainfall totaled 3.11 inches at the Central Weather Station. This is 1.45 inches below the normal of 4.56 inches. Total rainfall since January 1, 1951, has been only 11.31 inches or 5.33 inches less than normal. This with the excessively dry weather the last 3 months of 1950 has caused serious moisture deficiency and in many places shortages of water for domestic use and livestock. There was a very small amount of runoff from three areas without conservation practices during the month and none from the other areas. Area W-1 (176 acres) without conservation practices had 0.066 inch runoff on May 15 and the other two areas, W-2 (130 acres) and W-10 (20 acres) had smaller amounts. This is the largest amount of runoff since February 1950.

"Rainfall during the month did not produce any contrasting results in the moisture percentages on the cultivated areas of the conservation versus the conventional farmed areas. There was a small amount of runoff from the W area, though not enough to show any material differences between the two areas. The percentages of moisture on May 22, on the Y and W areas at the designated depths were as follows:

"Y Area: 0-6 inches, 27.6 percent; 6-12 inches, 27.4 percent; 12-24 inches, 26.5 percent; 24-36 inches, 24.6 percent; 36-48 inches, 24.6 percent; and 48-60 inches, 25.4 percent.

"W Area: 0-6 inches, 25.1 percent; 6-12 inches, 26.8 percent; 12-24 inches, 26.3 percent; 24-36 inches, 26.0 percent; 36-48 inches, 25.4 percent; and 48-60 inches, 25.4 percent.

"Moisture samples from oat land without a top application of 100 pounds of ammonium nitrate per acre in February showed 4.2 percent more moisture in the first foot of soil than the area with the nitrate. The added nitrate apparently enabled the oats to utilize for crop production more of the available moisture. The percentages of moisture on the areas with and without added nitrogen were as follows:

With added nitrogen: 0-12 inches, 20.5 percent; 12-24 inches, 23.3 percent; and 24-36 inches, 22.9 percent.

Without nitrate application: 0-12 inches, 24.7 percent; 12-24 inches, 22.6 percent; and 24-36 inches, 22.2 percent."

Hydrologic Studies - L. H. Stolzy, East Lansing, Michigan.-"Precipitation for the month of May, as measured by the U. S. Weather Bureau type of standard non-recording rain gages, amounted to 3.20 inches at the cultivated watersheds, 3.09 inches at the wooded watershed, and 3.24 inches at the stubble-mulch plots. These amounts are approximately 94 percent, 90 percent, and 95 percent, respectively, of the 50-year average May precipitation of 3.42 inches. May precipitation can be expected to equal or exceed 3.42 inches once in 2.16 years.

"There were no runoffs reported at the watersheds during the month of April.

"On May 1 Dr. Turk called together a group of men to set up an outline of data to be included on mark sensed IBM cards for the two cultivated watersheds. The following men were present: Dr. Erickson, Dr. Whiteside, Dr. Davis, Mr. Engberg, Dr. Turk, and the Acting Project Supervisor.

"The Experiment Station, mainly through the influence of Mr. Crabb, has appropriated money for the rental of IBM machines to be used for research in connection with the Experiment Station. These machines are located in the tabulating department of Michigan State College.

"The mark sensed IBM cards were used in place of the punch cards in that it would not require additional help from the outside, such as a key punch operator, to record the data on these cards. However, there is a disadvantage in that the mark sensed cards have only 27 columns for data, while the key punched cards have 81 spaces.

"The plans are to record on these cards certain data from the cultivated watersheds for the last 10 years and then to continue to record these data as they enter this office in the future. The daily data will be recorded on these cards in this order: Month, day, year, precipitation, runoff, soil loss, maximum temperature, minimum temperature, cover, snow depth, frost layer, and soil moisture for various depths. After these data for the 10-year period are recorded, a summary of soil and water loss shall be made showing the effects of winter conditions on both water and soil loss.

"On May 21 Dr. Whiteside, head of land classification, and the Acting Project Supervisor made an intensive study of soil profiles at the three watersheds for the purpose of locating sites to make the installations as mentioned in the monthly report of March 1951.

"It had been planned that we would locate similar sites in Watersheds 'A' and 'B' so as to make a comparative study in moisture and temperature conditions under different types of cover. However, the soil adjacent to the instrument house in Watershed 'A' had a mottled condition at 30 to 40 inches, indicating that we had some subsurface seepage in this area. In discussing this matter with the Station Committee, it was decided that the area should be remapped in the near future and that sites for taking daily soil moisture and soil temperature data should be located across the watersheds where similar sites can be found. Plans are being made to make these installations in the fall. Installations at the wooded watershed will be made as previously planned."

Hydrologic Studies - T. W. Edminster, Blacksburg, Virginia.-"Messrs. Holtan and Kirkpatrick report that a major part of their time was spent working with the Flood Control Field Office at Staunton, Va., testing methods of estimating runoff from various watersheds in that vicinity. In the course of this testing, a method of estimating infiltration, based upon the transmission and storage capacity of the soils as one limit and on the surface intake as governed by vegetative cover as another limit was developed. This method is now being prepared in manuscript form for possible publication.

"Messrs. Warner and Wilson of the Flood Control Office at Staunton were in Blacksburg on May 28 and 29. During these discussions and in light of the data introduced, it appears that some system, such as that of Holtan and Kirkpatrick's, is very definitely needed to estimate individual watersheds of the same size; that is, the flood producing capacity both from the infiltration standpoint and from the hydraulic efficiency standpoint.

"Both Messrs. Holtan and Kirkpatrick met with Mr. Marvin Hoover, Hydrologic Research man from Forest Service, Union, S. Car., and discussed with him the various phases of the hydrologic research program."

Hydrologic Studies - A. W. Cooper, Auburn, Ala.-"The May rainfall of 1.44 inches represents 41 percent of the 70-year average of 3.54 inches for Auburn. The first 5 months of this year the rainfall was 9.21 inches less than the 70-year average for the corresponding 5 months. The rainfall for the year 1950 was 12.71 inches short, and for the year 1949 it was 9.23 inches short. This present drought is seriously affecting the stand of row crops, the production of forage, and the ponds; the long-time shortage of rainfall is affecting ground water and wells.

"Mr. Cooper made a trip with Messrs. Bailey and Richardson to the Tuskegee Land Use Project, the Thorsby SCS Nursery, and the Black Belt Substation May 8 and 9 to observe the behavior of plants suitable for water disposal outlets, rotations, and pastures. Several important observations were made:

(1) Kentucky 31 fescue survived the severe winter well.

(2) The plant population of fescue does not seem to increase after the original seeding. The bunches become larger and thicken the stand, but even on thin stands the seed produced do not increase the plant population. There is no danger of fescue spreading from a water disposal outlet into fields. If a good stand is not obtained at the initial planting, it would

have to be overplanted at the proper time.

(3) Pensacola Bahia grass because of its running characteristic should heal scoured places in outlets better than fescue grass.

(4) Both reseeding crimson clover and white Dutch clover can be eliminated by allowing a heavy crop of grass to cover them. If the legume is to survive the heavy grass must be removed.

"Messrs. Cooper and Conniff attended the Alabama Section Meeting of the American Society of Agricultural Engineers May 11 and 12. At this meeting Mr. R. Y. Bailey, Regional Research Representative, presented a very effective discussion of the research activities in soil and water conservation in this region applicable to Alabama conditions.

"On May 10 Messrs. Cooper and Conniff met with the Irrigation Committee of the Alabama Experiment Station at the Dairy Production Unit to discuss problems involved in the production of succulent forage and the use of irrigation in this connection. Messrs. Cooper and Conniff agreed to work with Dr. Autrey, head of the Dairy Department, in the establishment and maintenance of stands of crimson clover and rye grass or oats early enough in the fall to provide grazing before cold weather. Factors to be investigated include: (1) the value of subsoiling for increasing water absorbing capacity, (2) the relative value of plowing and disking as compared to subsoiling and disking to control weeds, and (3) the value of the combination of fallowing and irrigation to control weeds.

"Mr. Cooper spent May 21 through 25 with Messrs. Sanders and Croft planning water disposal and land use for the Atmore Prison Farm. The purpose of Mr. Cooper's working with the Operations personnel on this farm was to set up with them some observational research studies. The farm consists of approximately 8,000 acres of land typical of the Lower Coast Plain area. It contains the best to the worst agricultural lands (Class I to Class VII). Details of the studies to be made have not been worked out. However, tentative arrangements have been made with Mr. Whitten, Superintendent of the State Prison Farms, to put in studies of (1) various vegetations in water disposal outlets of different types on several degrees of slopes; (2) row drainage and grades at which damage occurs in the rows; (3) kudzu to control head-fall gully erosion, which is a very serious problem since they have several gullies that are 20 to 60 feet deep and are going toward and into Class I land; (4) vegetative treatment in peach orchard to control erosion, and (5) controls for wind erosion in that section.

"Mr. Lockett reports mechanical analyses on four soils at three depths each (table 1) and permeability determinations on one soil (table 2).

Table 1.--Mechanical analysis of soils (Alabama)*

Particle Size	Description	Carnegie - Depth 1"-4"	8"-11"	21"-24"
		Corrected average		
Mm		Percent		
2	Gravel	1.06	4.57	29.21
2-1	Fine gravel	.33	.34	1.02
1-.5	Coarse sand	1.68	1.77	.85
.5-.25	Medium sand	3.25	3.29	1.57
.25-.1	Fine sand	19.77	12.26	10.94
.1-.05	Very fine sand	21.88	19.15	17.72
.05-.005	Silt	38.39	35.78	23.69
.005	Clay	13.66	16.84	15.00
	Total	100.00	100.00	100.00

Particle Size	Description	Red Bay - Depth 0"-3"	15"-18"	25"-28"
		Corrected average		
Mm		Percent		
4-2	Gravel	0.00	0.00	0.00
2-1	Fine gravel	.53	.33	.40
1-.5	Coarse sand	3.39	2.93	2.53
.5-.25	Medium sand	12.81	11.18	10.20
.25-.1	Fine sand	40.62	39.38	35.36
.1-.05	Very fine sand	14.53	9.70	11.02
.05-.005	Silt	21.40	16.56	18.80
.005	Clay	6.72	19.92	21.69
	Total	100.00	100.00	100.00

Particle Size	Description	Irvington - Depth 0"-3"	12"-15"	24"-27"
		Corrected Average		
Mm		Percent		
2	Gravel	6.25	9.76	28.55
2-1	Fine gravel	1.21	.98	1.26
1-.5	Coarse sand	3.36	2.35	1.82
.5-.25	Medium sand	6.14	4.93	3.65
.25-.1	Fine sand	21.80	19.69	14.29
.1-.05	Very fine sand	15.43	15.72	12.13
.05-.005	Silt	27.17	29.30	22.67
.005	Clay	18.64	17.27	15.63
	Total	100.00	100.00	100.00

Textural classification as determined by mechanical analysis.
Carnegie: Loam all depths.

*Data obtained jointly by SCS Research and Operations.

Table 1.--Mechanical Analysis of soils (Alabama)--Continued*

Particle Size	Particle Description	Irvington - Depth 0"-3"	9"-12"	22"-25"
		Corrected average		
Mm		Percent		
2	Gravel	17.97	11.94	11.35
2-1	Fine gravel	.29	.35	.49
1-.5	Coarse sand	1.66	1.70	1.72
.5-.25	Medium sand	6.85	6.96	6.57
.25-.1	Fine sand	22.33	23.62	23.86
.1-.05	Very fine sand	14.86	16.33	12.45
.05-.005	Silt	26.64	30.87	27.90
.005	Clay	9.40	8.23	15.66
	Total	100.00	100.00	100.00

*Data obtained jointly by SCS Research and Operations.

Textural classification as determined by mechanical analysis:

Red Bay: Sandy loam - 0"-3" and 15"-18"; sandy clay loam - 25"-28".
Irvington: Sandy loam - all depths.
Irvington: Sandy loam - all depths.

Table 2.--Permeability of Soils (Alabama)*

Depth of profile	Depth of sample	Field moisture content	Moisture content saturated	Percolation Field moisture	Percolation Saturated	Volume weight	Water drained 15 min.	Water drained 15. hr.
Inches	Inches	Percent	Percent	In./hr.	In./hr.	Gm/cc	Cc/100 gm	
Cecil								
0"-8"	2"-5"	27.04	48.80	23.92	11.23	1.16	12.74	19.79
8"-18"+	12"-15"	21.50	36.87	.38	.91	1.42	6.20	12.14

*Data obtained jointly by SCS Research and Operations

Runoff Studies - N. E. Minshall, Madison, Wisconsin.-"Precipitation at Edwardsville for the month was 2.14 inches, which was well distributed throughout the month with no high intensities and very little runoff.

"Precipitation at Colby for the month was 2.71 inches, which is nearly normal. The soil moisture remained near field capacity for the entire month and there was a moderate amount of surface runoff.

"Precipitation at Fennimore for the month was 3.94 inches, which was well distributed with no high intensities and little surface runoff. Temperatures were near normal. On May 22, soil-moisture blocks were placed at five different locations in the area by 6-inch intervals from 3 inches up to 27 inches in depth at each location.

"Compilation of rainfall and runoff data for the McCredie Experiment Station Watershed have been completed through 1950. Rainfall-runoff relationships during the last 4 years show a considerable reduction in percentage of runoff during the period of May to September, but little difference during the rest of the year. This appears to be due to terracing and the increase of area of treated pastures."

Hydraulic Studies - F. W. Blaisdell, Minneapolis, Minnesota.-"The research report covering the box inlet drop spillway tests was reproduced, and printed copies were returned to the Laboratory on May 29. This report is being published as Technical Paper No. 7, Series B, of the St. Anthony Falls Hydraulic Laboratory and is entitled "Capacity of Box Inlet Drop Spillways under Free and Submerged Flow Conditions." Distribution of this report is being held up pending the completion of the design report. Since the reports are supplementary, they will be distributed together. The plates for the design report were completed during the month, and the report was in the hands of the printers.

"The computations on one drop inlet and the complete tests of another drop inlet were accomplished during May. The latter drop inlet was square in plan, and the sides of the square were 1 pipe diameter long. The area of this drop inlet was so small that the pipe did not flow full until the level of the pond upstream had been raised considerable above what it would have been if the pipe had flowed full at a lower pool level. Late in the month, a request was received from the Regional Office to conduct tests using a circular drop inlet of the type being used in Missouri. Plans for these tests were roughed out, a test schedule was revised, and construction of the first model was under way.

"Mr. Donnelly reports that 18 tests were made on the straight drop spillway using two different heights of fall and two different heads, the fall heights being 5 inches and 10 inches and the heads being 2 inches and 6 inches. He found that the longitudinal sills could be omitted with the low heads, but that they are needed for higher heads for both heights of fall. These tests were part of the exploratory test program which has now been completed. The details of a test program to determine the proportions of this stilling basin are now being worked out."

Hydraulic Studies - W. O. Ree, Stillwater, Oklahoma.-"The major activity at the laboratory during May was working on the Pipe Outlet Experiment. Since the last report the following items have been completed:

1. Poured the Gage Pit for the piezometer lines.
2. Poured the floor for the Instrument House and set the house in place.
3. Completed the concrete work for the crossing and cutoff structure at supply canal station 6 + 62.
4. Built up the supply canal embankments from station 6 + 50 to 12 + 40.
5. Completed fine grading at the 4-foot Parshall flume and at the 3' crossing and cutoff structures.
6. Completed the excavation of the reservoir and construction of the dykes. The quantity of earth works totaled about 4,300 yards.

"The big items remaining on the Pipe Outlet Experiment are:

1. To lay the 24-inch corrugated pipe line.
2. To establish a grass cover on the reservoir floor and dykes.

"In addition there are a number of small items such as building gate hoists and gates and setting up the manometer board.

"The work on the runoff studies progressed satisfactorily. The calibration by model tests of one of the culverts is nearly complete. Two culverts have been equipped with gage wells, and two rain gages have been set in place."

Supplemental Irrigation Studies - J. R. Carreker, Athens, Georgia.-"A serious drought developed over a large area of the Southeast during May. Rainfall at our plots was 0.65 inch for the month. This fell in showers of 0.35 inch and 0.30 inch on the 20th and 26th, respectively.

"Evaporation from the pan totaled 8.13". The wind movement was 1,033.5 miles.

"The soil-moisture content was high at the beginning of the month. Row crops that were planted in late April or the first few days in May came up to a good stand. These crops were not suffering seriously for moisture at the end of the month. Very poor stands were obtained from plantings made during the latter half of the month and on freshly prepared land during the first of the month.

"Sod crops like pastures, small grains and fescue grass suffered badly for moisture the last half of the month.

"Irrigation applications were made on the pastures at the irrigation plots on the University farm, a pasture of fescue grass at Watkinsville, the corn plots at Watkinsville (to obtain a good stand), alfalfa and soybeans on the 100-acre farm and a patch of young crimson clover on the Watkinsville station.

"Soil-moisture measurements were made at several locations at intervals throughout the month. Some data of interest at this time are tabulated below on irrigated and unirrigated grazed fescue grass."

Date	Rainfall and irrigation	Irrigated			Unirrigated		
		0-6"	6-12"	12-18"	0-6"	6-12"	12-18"
	Inches	Percent moisture in soil					
April 28	0.66						
May 10	1.5						
May 11		16.2	23.0	22.6	8.1	8.5	21.4
14		12.7	18.0	25.0	6.3	8.9	20.2
18		8.6	17.9	16.5	5.4	9.6	17.1
20	.11						
21		8.3	16.4	20.5	5.6	12.6	21.5
22-23	1.5						
24		15.0	24.3	20.3	5.3	12.4	21.0
27	.13						
29		9.7	18.2	22.5	5.4	10.2	18.6
31	1.75						
June 2		15.2	18.3	19.0	4.4	8.2	17.5

Supplemental Irrigation in Virginia Agricultural Production - T. W. Edminster, Blacksburg, Virginia.-"The rainfall for the month was below normal with only 2.35 inches at the irrigation control plots. Moisture samples were taken from the two lots which receive irrigation, and irrigation was begun when the percentage of available moisture reached 40 percent. However, due to engine difficulties with the gasoline unit, it was necessary to switch the system over to the smaller electric pumping unit; however, very slow progress was made with the unit since it had only one-half the capacity of the gasoline pump.

"Fourteen lateral positions have been completed in the first application of 1.5 inches of water on the two irrigated lots.

"Eight steers have now been placed in each of the four pasture lots of the irrigation study.

"On the irrigated control plots two applications of 0.5 inch have been applied to the wheat plots, 0.5 inch to corn plots, 1.0 inch to the clover plots and 1.5 inches to the alfalfa plots after the first cutting of hay.

"The land has been prepared for the burley tobacco plots, but no plants have been set."

Drainage Studies - J. C. Stephens, West Palm Beach, Florida.-"At the Everglades Experiment Station, Belle Glade, the main effort was directed toward the installation of the six concrete soil tanks which are to be used for evapo-transpiration tests and for the determination of the tolerance of different crops to high water tables. All six tanks were waterproofed and placed in the ground during the past month. Each of the tanks appears to be sufficiently watertight to permit use in obtaining reliable transpiration data. At the end of the month, false-bottoms were being placed in the tanks preparatory to covering with sorted gravel and then refilling with soil. It is planned that all six tanks will be planted with kenaf, a commercial fiber, during the first half of June. Under normal conditions, this plant should mature in the fall when it will be tested to determine the critical high water level and flooding period. After this, a truck crop, such as beans, commonly grown in the Everglades will be grown for testing. It is planned to plant the fiber crop, ramie, about February 1 which will allow for the flooding test on this crop during 1952.

"Flow measurements were made on Slope Courses 'A' and 'B' along Tamiami Canal. Results will be found on the tables appearing on the next pages for the measurements made last month and also in February of this year. These tests will be continued at regular intervals throughout the year in order to make a comparison with last year's results in order to determine, if possible, the related effects of cool weather and the flow velocity in affecting the retardance coefficient in channels containing the aquatic growth Najas guadelupensis.

"A 5-mile stretch of peat levee was resurveyed at Hillsboro Plantation to determine levee subsidence. Cross sections were made normal to the axis of the levee at 1/4-mile intervals at the same stations where cross sections were made in April 1949. Both surveys have been plotted and the 1951 survey super-imposed on the 1949 survey. Both sections are being planimetered in order to determine the loss in elevation and of volume by subsidence during the two-year period. Observations made during the course of the survey revealed that the loss of volume, which can be computed from the planimetered cross sections, will not give the entire story

Table 1.--Slope course "A" on the Tamiami Canal just west of bridge at Sweetwater, Fla.

Length of slope course: 3,000 ft.

Date of obersvation	Average maximum width	Average surface width	Flow	Average cross section area	Mean velocity	Mean hydraulic radius	Slope	Coefficients			Elevation bank full stage	Elevation water surface	Elevation of bottom
								Chezy C	Manning n'	Kutter n			
	Ft.	Ft.	Sec. Ft.	Sq. ft.	Ft./sec.		Ft.-Ft.						
2/16/51	8.1	46.9	99.7	311.8	0.320	5.93	0.000022	28.07	0.071	0.084	7.2	3.90	-4.2
5/ 8/51	7.2	45.3	51.1	266.7	.192	5.33	.0000293	15.37	.128	.142	7.2	2.99	-4.2

Description of Ditch: Arterial drainage canal. Course: straight. Cross section: little variation in cross section some irregularities on side slopes and banks caused by dragline excavation and solution holes in Miami Oolite limestone. Bottom: generally regular. Soil: channel excavated into Miami Oolite limestone from top to bottom. Condition: canal redredged and cleaned in spring of 1948. Growth condition: banks essentially clear of vegetation.

2/16/51: Moss growth less than usual due to cool weather. Note: wind from E, 15 mph.
5/8/51 : Moss growth along both banks extending 5 to 8 ft. into water. Some growth along bottom but center of channel is generally clear.

Table 2.--Slope course "B" on the Tamiami Canal just west of bridge at 119th ave., Miami, Fla.

Length of slope course: 3,000 ft.

Date of observation	Average maximum depth	Average surface width	Flow	Average cross section area	Mean velocity	Mean hydraulic radius	Slope	Coefficients			Elevation bank full stage	Elevation water surface	Elevation of bottom
								Chezy	Manning	Kutter			
								C	n'	n			
	Ft.	Ft.	Sec. ft.	Sq. ft.	Ft.-sec.		Ft.- ft.						
2/7/51	6.3	47.7	89.3	233.1	0.383	4.57	0.000092	18.69	0.102	0.111	7.0	4.47	-1.8
5/8/51	Flow too slow for measurement. Moss growth heavy												

Description of Ditch: Arterial drainage canal. Course: straight. Cross section: little variation in cross section, some irregularities on side slopes and banks caused by excavation and solution holes in Miami Oolite Limestone. Bottom: generally regular. Soil: channel excavated into Miami Oolite limestone from top to bottom. Channel not maintained in recent years. Growth condition: small brush and vegetation along north bank but mostly above water line.

2/7/51: Moss growth much less than usual due to cold weather. Note: wind blowing from S. W., 30 mph.

Table 3.--Test plantings of grass on levee 35-A near North New River Canal

Legend:
A - Dense stand of new runners
B - Average " " " "
C - Poor " " " "
D - No new growth.

Levee plot No.	Exper. Sta. plot No.	range	Name of grass		Growth conditions: General vitality Feb.15 - May 16		New growth (see legend) Feb.15 - May 16:		Av. length new runners (in.) Feb.15 - May 16:	
1			Bahamian	Bermuda	Good	*Good	C	C	1-2	6-12
2	VII	6	"	"	Good	*Good	B	C	8-12	20-24
3	VII	8	"	"	Good	*Excellent	C	B	36-48	60-72
4	I	1	"	"	Good	*Poor	B	B	14-18	48-60
5	VII	7	"	"	Good	*Poor	C	B	14-18	12-18
6	IV	9	"	"	Good	Good	C	C	2-3	3-4
7	VI	16	"	"	Poor	Poor	B	C	6-8	8-10
8	IV	12	"	"	Good	Good	B	C	8-12	12-18
9	V	8	"	"	Good	*Excellent	B	C	8-12	10-15
10	VI	4	"	"	Good	*Good	C	A	3-4	10-15
11	VI	9	"	"	Good	*Good	B	C	6-8	6-8
12	VI	5	"	"	Excel.	Good	B	B	3-4	12-15
13	V	11	"	"	Poor	*Excellent	C	C	12-14	10-15
14	I	3	"	"	Good	Poor	A	C	6-12	8-10
15	I	2	"	"	Good	*Good	B	A	8-10	15-18
16	IV	13	"	"	Poor	Poor	C	B	4-6	18-24
17	II	19	"	"	Good	*Poor	C	C	4-6	6-8
18	V	10	"	"	Excel.	*Poor	B	C	4-6	12-15
19	V	9	"	"	Poor	*Excellent	C	B	2-3	8-12
20	VI	15	"	"	Good	Poor	C	C	12-14	3-4
21	VI	14	"	"	Good	*Good	B	C	14-18	12-18
22	I	17	"	"	Good	*Poor	B	B	2-3	18-24
23	I	14	"	"	Good	*Good	C	B	12-14	5-6
24	IV	20	"	"	Good	*Poor	C	B	12-14	8-
25	I	11	"	"	Good	*Poor	B	C	3-4	12-15
26	V	13	"	"	Good	*Good	A	C	12-14	12-15
27	VI	19	"	"	Good	*Poor	B	B	3-4	24-36
28	III	11	"	"	Good	*Good	C	C	6-8	18-24
29	V	14	"	"	Good	*Good	C	D	6-8	
30	III	1	"	"	Poor	*Poor	C	B	6-8	12-18
31	III	6	"	"	Good	*Poor	D	C		10-12
32	I	5	"	"	Good	Poor	C	C	3-4	4-5
33	V	17	"	"	Good	*Good	B	C	18-20	10-12
34	II	18	"	"	Good	*Poor	B	B	2-4	18-24
35	II	17	"	"	Good	*Good	C	A	6-8	8-12
36	II	20	"	"	Good	Good	B	B	12-14	18-20
37		4	Everglades	Bermuda	Good	Good	A	A	20-24	36
38	VI	7	"	"	Good	*Good	B	A	24-30	36-48
39	VI	6	"	"	Poor	Good	D	A		24-36
40	I	15	"	"	Good	*Poor	B	C	4-6	4-6
41	III	9	"	"	Poor	Good	C	C	6-8	15-18

*Plant producing seed as of May 16.

Table 3.--Test plantings of grass on levee 35-A near North New River Canal--Cont'd

Legend:
A - Dense stand of new runners
B - Average " " " "
C - Poor " " " "
D - No New growth.

Levee plot No.	Exper. sta. range	plot No.	Name of grass	Growth conditions: General vitality Feb. 15 - May 16		New growth (see legend) Feb. 15 - May 16		Av. length new runners (in.) Feb. 16 - May 16	
42	III	8	Everglades Bermuda	Poor	*Poor	B	C	2-3	18-24
43	III	1	" "	Good	Good	C	C	6-8	5-6
44	III	5	" "	Poor	*Good	C	D	24-36	-
45	VI	20	" "	Good	*Poor	B	C	12	8-10
46	III	4	" "	Poor	*Poor	C	B	12	20-30
47	I	16	" "	Good	*Good	A	A	24-36	24-40
48	V	3	Bermuda	Good	*Good	B	B	12-18	18-24
49	III	2	"	Poor	*Poor	C	C	24-36	10-15
50	II	6	"	Poor	*Poor	C	D	6-8	
51	II	4	"	Good	*Poor	C	C	2-3	4
52	VI	11	"	Good	*Poor	C	C	2-3	8-10
53	II	7	"	Poor	*Poor	D	D		
54	VI	17	"	Good	*Poor	C	B	8-10	12-18
55	II	5	"	Good	*Good	B	B	24-36	36
56	III	13	"	Good	*Good	B	B	18-24	20-24
57	VI	12	"	Good	*Good	B-	A	12-18	24-30
58	VI	3	"	Good	*Good	C	C	6-8	6-8
59	I	10	"	Excel.	Good	B	A	24-36	36-48
60	I	12	"	Good	*Good	B	B	12-18	8-10
61	I	13	"	Good	*Good	B	B	4-6	8-10
62	III	7	"	Poor	*Poor	D	C		18-20
63	I	19	"	Good	*Good	B	B	18-20	12-18
64	I	6	"	Good	*Poor	C	D	12-18	
65	III	12	"	Good	Poor	C	C	8-12	6-8
66	VI	10	"	Good	*Good	B	C	3-6	8-10
67	III	3	"	Good	*Good	B	B	3-6	12-18
68	II	16	"	Poor	*Poor	C	C	4-6	5-6
69	III	2	"	Poor	*Poor	B	B	6-8	18-24
70	II	15	"	Poor	*Good	B	B	6-8	8-10
71	I	4	"	Poor	*Poor	C	B	8-12	24-36
72			Maiden Cane	Dead					
73	VIII	6	Pensa. x Com.	Excel.	Excellent	A	A	24-36	24-30
74	VIII	5	St. Augustine	Good	Good	B	A	36-48	48-60
75	VIII	8	"	Poor	Poor	C	C	12-24	15-20
76	VIII	3	"	Good	Poor	B	B	12-24	20-30
77	VIII	6	"	Dead					
78	VIII	9	Maiden Cane	Dead					
79	VIII	1	Pensa. x Com.	Poor	Poor	C	C	24-36	24-30
80	VIII	10	St. Augustine	Good	Poor	A	A	36-48	48-60
81	IX	2	"	Poor	Poor	C	C	6-12	20-24
82	IX	3	"	Good	Poor	B	B	12-24	36-40

Table 3.--Test plantings of grass on levee 35-A near North New River Canal--Cont'd

Legend:
A - Dense stand of new runners
B - Average " " " "
C - Poor " " " "
D - No new growth.

Levee	Exper. sta.		Name of grass	Growth conditions: General vitality		New growth (see legend)		Av. length new runners (in.)	
				Feb. 15 - May 16		Feb. 15 - May 16		Feb. 16 - May 16	
83	IX	7	St. Augustine	Poor	Dead	D			
84	IX	10	"	Good	Poor	C	C	12-36	20-24
85	IX	18	"	Dead					
86	IX	17	"	Poor	Poor	C	B	24-36	36-48
87	IX	1	"	Good	Good	C	C	24-36	20-24
88	IX	14	"	Good	Poor	B	C	12-24	20-30
89	IX	6	"	Good	Poor	B	C	36-48	36-48
90	IX	16	"	Good	Poor	A	B	36-48	36-48
91	VIII	7	"	Dead					
92	VIII	4	"	Dead					
93	X	13	Bahia	Good	Good	C	B	3-6	6-8
94	X	1	"	Good	Poor	C	C	5	11
95	X	5	"	Poor	Good	D	B		3-4
96	X	16	"	Poor	Poor	D	B		4
97	X	3	"	Good	*Poor	C	C	5	6-8
98	X	18	"	Poor	Poor	D	D		
99	X	12	"	Poor	Poor	C	C	2	4-5
100	X	10	"	Poor	Good	D	B		4
101	X	15	"	Dead					
102	X	7	"	Good	*Good	C	B	4	8-10
103	X	6	"	Dead					
104	X	9	"	Dead					
105	X	8	"	Good	Poor	C	B	1	3-4
106	X	11	"	Poor	*Poor	D	B		3-4
107	X	17	"	Dead					
108	X	19	"	Good	Good	C	A	2	8-10
109	X	14	"	Good	Good	D	C		2-3
110	X	2	"	Poor	Good	D	D		
111	IX	23	Para	Good	Excellent	B	B	72	24-30
112	VII	24	Rhodes	Poor	*Poor	D	D		16
113			Carib	Good	Excellent	B	C	36	8-10
114			Centipede	Good	Excellent	C	C	2	4-6
115			Pangola	Good	Excellent	A	A	84-120	84-120
116	X	4	Z. Matrella	Excel.	Good	C	C	3-8	4-6
117	X	3	" "	Excel.	Excellent	C	C	3-8	6-8
118	X	1	Blue Couch	Good	Good	C	B	8-10	6-10

inasmuch as there has been considerable loss in density of the peat material composing the levee which is evident by the additional shrinkage cracks and the enlargement of the older cracks as compared to those observed 2 years ago. It is expected to continue these surveys at approximately 2-year intervals. When Hillsboro Plantation, the land owners, decides to bring this virgin soil into agricultural

production, they plan to roll and compact the dike thus eliminating the shrinkage cracks and increasing the density. Surveys made at that time should give a clearer picture as to relationship between volume and density losses in peat dikes.

"Informal cooperation with the Corps of Engineers on seepage investigations continued. Several visits were made during the month to the seepage test basin located west of Miami just off Tamiami Trail and Krome Avenue. The seepage basin was built by constructing four different types of test levees to form a rectangular basin. The north and south levees are 622' ± outside dimensions and the east and west levees are 340' ± outside dimensions. The inside dimensions are 100 feet along the east-west axis and 400 feet along the north-south axis, as measured from levee toe to levee toe The west levee, Side 'A,' was constructed by the side-cast fill method, which is the method that has been most commonly used to date in construction of the levees for the Federal Flood Control Project; the north levee, Side 'B,' was built by the side-cast fill method but contains a substantial peat core; the east levee, Side 'C,' was constructed by the hauled-in fill method; while the south levee, Side 'D,' was constructed by hauled-in fill which was placed in 18-inch lifts and compacted with a 25,000 lb. wheel loaded roller between the placing of successive lifts.

"Water is pumped from the outside borrow pit into the basin by means of a 12,000 gpm pump. Pumpage is measured by means of a piezometer tube and calibrated orifice plates. Seepage trenches, equipped with measuring weirs, were dug just outside the outer toe of the levees. Flow collected by these trenches and subsequently measured by the outflow weirs is, at present, assumed to be passing through the levee or along the plane between the base of the levee and the original soil. After adjustment for change in storage and evaporation, the difference between pumpage into the basin and flow collected by the seepage trench is assumed to be deep percolation loss.

"First tests indicated considerable leakage through several of the levees. After the first test was finished and the basin had been drained, the pool-side slope of each levee was compacted by rolling with a heavily loaded, pneumatic tired, roller. When the test was rerun, it was found that levee leakage had been reduced considerably.

"On June 8, during the second test, the rate of pumping or inflow was approximately 10,400 gpm. The pool surface was 13.7 msl and tail water (borrow pit level) was 3.1 msl, giving a head of 10.6 feet. The stage within the basin was then increasing at a very slow rate. The weir passing water collected from the west levee, constructed by the side-cast fill method, was flowing at a rate of 2,350 gpm; the weir for the seepage trench along the north levee; containing a peat core, was flowing only 57 gpm; two weirs catching the seepage water along the east levee, which was constructed from hauled-in fill, passed a total of approximately 1,700 gpm; and there was no flow apparent along the south levee, which was constructed from hauled-in fill compacted in 18-inch lifts. These flow measurements indicate a total levee leakage in the neighborhood of 4,000 gpm against a deep percolation leakage of from 5,000 to 6,000 gpm, depending upon the final correction for change in storage.

"It is planned by the Corps of Engineers to drain the pool and then scarify the slope along the pool-side of each levee to a depth of approximately 18 inches to 24 inches removing all large rocks and boulders to this depth. The slope will then be recompacted by the pneumatic tired roller, as before, and the flooding tests repeated. When data from this operation have been procured, the basin will be drained and the pool-side slopes will be removed by dragline to considerable depth and subsequently replaced in 18-inch lifts being rolled with a Sheep's Foot Roller between each lift and then thoroughly compacted, and the test repeated. When data from this procedure

are procured, it is planned to burn over the vegetation on the peat soil in the bottom of the basin, disk the soil and then compact it thoroughly by rolling. The flooding tests will be repeated to determine this effect in reducing deep percolation losses."

Drainage Studies - I. L. Saveson, Baton Rouge, Louisiana.-"The project supervisor met with the Board of Supervisors of the Upper Delta Soil Conservation District at New Roads to outline and assist them in equipment needs and methods for pasture grading work. I showed them a number of slides and the techniques developed at the project.

"The project supervisor was at Tallulah on May 21-25 at the request of the SCS State and district office to assist them in developing a land drainage program for drainage of cotton land. A detailed report of this trip appears below.

"The Project Supervisor was at Tallulah, La., which is located in the cotton area of the Mississippi delta. The purpose of this visit was to look over the drainage problem and also work with the district personnel in working out procedures for the use of a recently purchased Bee-Gee land leveler. This visit was at the request of the Soil Conservation Service to State and district offices.

"The district drainage work is primarily surface drainage. The average rainfall for the area is 53.09 inches per year (34-year record). This is indicative of the need for surface drainage. The drainage facilities that are being constructed in this area consist of a system of mains, lateral ditches, and field drains. From the project records on 4,575 acres of land the average was 0.26 mile of main (dragline ditch), 0.74 mile of laterals (generally grader constructed ditches 2 feet deep with 4:1 side slopes, 1.27 miles of field drains (grader constructed ditches with 4:1 side slopes) per 100 acres of land.

"The 1945 study of the Louisiana Agricultural Economics Department reveals the following: The cotton area of the Mississippi delta in Louisiana had 3,918,000 acres in farms, of which 2,043,000 acres were in tilled crops and 535,000 in permanent pastures. The last two items totaling 2,578,000 acres require drainage for crop production.

"Past tillage practices and overflow have left a number of depressions in the field which are difficult to drain. Also, in some instances earth from ditch excavations is causing a dyke or barrier which impounds surface water. The back furrows from plowing is also contributing to the problem. These depressions are very evident in the field and are indicated by the impaired growth or complete failure to get a stand of the crop planted, especially corn and cotton.

"The depressions listed are of two catagories, pot holes and sloughs. They vary in depth from minute depressions to a foot or more for some of the sloughs. In order to secure surface drainage it becomes necessary to ditch out these areas or fill them. It is evident that it is an impossibility and impractical to ditch all the depressions. Therefore the logical alternative is to fill them. In many instances the earth which may be causing the dykes or barrier can be removed and used for making fills.

"The district supervisors, aware of the problem, have purchased a Bee-Gee DSP-50 land leveler to grade the field and facilitate drainage. Land levelers are a new grading tool for this section of the country, and district personnel, farmers, and

dealers are not experienced in their use and limitations, especially under Louisiana conditions. The Soil Conservation Service research project at Baton Rouge has not had the funds to expand its research to this area.

"The need for drainage research in this area has been brought to the attention of the Project Supervisor and the Washington office for several years by the State Experiment Station, local people, and the district conservationist. The grading of cotton land is being started with a number of unanswered questions, some of which are:

a. What benefits can be expected from this grading work with local crops?
b. How much can be expended for grading work per acre and make it pay?
c. What reduction can be expected in tillage and harvesting costs?
d. What is the most efficient procedure and grading technique to accomplish the work?
e. What alterations are necessary to be made to equipment designed for arid conditions to work under Louisiana conditions?

"Approximately 100 acres were worked this spring on the Woodyear Plantation. The procedure used was to rough grade the area with a bulldozer and then smooth the area with the Bee-Gee land leveler. Four passes were made with the land leveler, one crosswise of the area, two diagonally at approximately 45 degrees and one lengthwise. Two maps of the area are included in this report (copies can be obtained from the project, if so desired), one prior to grading and a second map after grading. The district indicated that a plantation laborer was used for a rodman and the levels may not be of the precision desired. They do, however, give a very good indication of the work. Visual inspection of the area shows some pockets, and additional work will be required. However, the area as a whole is very good and in general should drain with the exception of some isolated instances.

"The following is a breakdown of the grading costs using district equipment at district rates:

130 hrs.	D-7 dozer	at $ 8.00/hour	$1,040.00
6 days	Tractor & disc	10.00/day	60.00
4 days	Tractor & tool bar cultivator	12.00/day	48.00
8 days	Tractor & Land leveler	85.00/day	680.00

"The earth from cutting field and lateral drains after grading often disrupts the grading. Practically all the above drains are cut with a motor grader. The laterals are cut parallel to the slope and the earth cast in two directions, since the rows run parallel to the ditch this earth in general only interferes with the row drainage at the intersection of the field drains which are perpendicular to the slope. The earth is hard to remove from the corners. The earth from the field drains is cast on the downward side of the ditch. This does not interfere with the drainage but a resulting high shoulder interferes with tillage and harvesting operations. This condition emphasizes the need for a ditcher which will completely dissipate the spoil.

"At the present the district supervisors do not have a tractor to pull the land leveler. They are routing the land leveler to various plantations who have large tractors available. In talking with the overseers of these plantations there are varied opinions on the use of the land leveler and its limitations. It was evident from their conversation that they are looking at the land leveler as an earth moving tool rather than a finishing tool. By this routing system there is a green

operator on the machine at each new location which does not make for good maintenance and efficiency.

"The cost studies listed above are on the Woodyear Plantation. The cuts and fills made were generally within the range of efficient dozer operation (150 to 300 feet--depending on skill of operator). On the jobs under construction during this visit scrapers would have made for better efficiency. On the Yeager Plantation, a spoil bank from an outlet channel would have been a source of earth to fill the depressions; the maximum hauls would probably have been approximately 1,000 feet, which is tractor scraper haul distance. The overseer was trying to fill depressions by making cuts and fills with the land leveler. Normally, grading equipment works best on firm earth. The plantation had disced the field several times and it was very loose. It was also noted that where the machine made heavy cuts the bald spots were very hard and tough, especially in buckshot soil.

"It is recommended that yield records be kept on the graded area and the area adjacent on the south be used as a check area. The data will not be comparable since the proposed check area, according to the district personnel, was in no way in as bad condition as the treated area; however, this should give some indication as to the benefits. It is my understanding the plantation owner, Mr. Woodyear, has a fairly good past history of the treated area. This should also help in making an estimate of the benefits.

"It is recommended that the grading work be spread over a 2-year period and the following procedure given a trial:

"First Year: Rough grade the area by eye with dozer or tractor scraper. The maximum distance for using the dozer be considered from 300 to 400 feet with a skilled operator, preferably 300 feet; with a partially skilled operator--200 feet. Earth moving distances beyond 300 feet, tractor scrapers are recommended. Scrapers can be used on shorter hauls efficiently and on hauls of 900 to 5,000 feet rubber tired tractors are more efficient than crawlers.

"After rough grading the area, pass the land leveler over the area from two to four times, depending on the condition of the area. Prior to the last pass, cut or clean the lateral ditch.

"The following is a breakdown of the proposed trial:

a. Operate the land leveler crosswise the area.
b. Rough grade the area with dozer or scrapers, whichever is applicable.
c. Operate the land leveler diagonally across the area.
d. Operate the land leveler diagonally across the area in the opposite directionto b.
e. Cut or clean the lateral ditches dissipating the earth as far back from the ditch as is feasible. If a scraper is available, this earth can be used to fill depressions evidenced by the prior passes of the land leveler.
f. Pass the land leveler lengthwise of the area.
g. Cut or clean the field drains, moving all earth down the slope.
h. Plant the area and keep it under observation until the second year. This should give the fills an opportunity to settle, the raw soil to weather, and observations after heavy rains should indicate areas requiring further attention, and will spread the work required by the farmer.

"(Note). The above procedure is for the common practice where the lateral ditches are parallel to the slope and the field drains across the slope.

"Second Year. Run levels and set grade stakes where additional work is required which was indicated in the previous season. The staking practice that has been most workable at the project is to grade the area, generally on 100-foot intervals, marking amount of the cuts on the stakes and a line on the fill stakes to indicate the height of fill. The area is worked in lanes, leaving the cut stakes on islands of earth until the land leveler is used in finishing the area. The common practice used in irrigated lands is to rough grade the area to within 1/10 of a foot. The required grading beyond 1/10 foot is accomplished by the land leveler in finishing. It is further recommended that the grading work be not carried to a point of obtaining a uniform slope over long distances. The primary purpose is to grade the field so it will drain, filling the depressions and removing the barriers. Therefore the slope should be broken whenever it will lessen the amount of earth to be moved.

"It is recommended that some arrangement be made for instruction, training, and demonstration in the use of land leveling equipment, since it is a new type of equipment foreign to this area. The need for this should be pointed out to the manufacturers. If they do not have sufficient volume of business to justify the necessary instruction, training, and demonstration in using land leveling equipment, I personally feel that for the good of the work the Service should take the lead.

"It is recommended that as soon as the district is in a position to purchase a tractor that they employ an operator and do the land leveling on a custom basis rather than leaving the operation to various plantations. This should lead to better care of the machine and supply an experienced operator on the work. The district personnel requested information on heavy wheel tractors for pulling the land leveler. The following is the information I have on hand.

"In order to eliminate back furrows and plow marks the district is recommending the use of a tool bar equipped with orchard type cultivator teeth for breaking land. These have proven satisfactory. However, they are not practical for turning under crop residues and cover crops. It is recommended that consideration be given to the use of two-way breaking plows.

"It is recommended that the project expedite the development work on the proposed ditcher to cut any slope and completely dissipate the spoil. This is urgent since the spoil from small ditch excavations often help to impair the drainage of the area and interferes with tillage operations.

"It is recommended that the research work of this project be expanded to the cotton area of the Mississippi and Red River deltas to answer the acute problems previously listed. If the research is not expanded it will be necessary for the district personnel to secure the needed information by field trial methods which takes their time from district and PMA obligations. If this research is expanded to this area there are other items not listed which should be given consideration, such as elimination of plowsole, seepage, and new conservation developments to stimulate interest in the conservation program.

"The district personnel inquired as to the availability of wheel tractors to pull the DSP-50 Bee-Gee land leveler. We do not have the draw bar pull required to work the land leveler. However, the company recommends from 40 to 60 H. P. tractors. I am assuming that this is based on crawler tractors. The maximum drawbar pull range for crawlers of this class is: first gear approximately 10,000 to 17,000,

second gear 7,000 to 10,000. Most land leveler work is done in second gear. It would seem logical to assume that we should have not less than 8,500 pounds drawbar pull.

"The district inquired as to the feasibility of the Massey-Harris 55 tractor pulling the land leveler. From the Nebraska tests this tractor produced a maximum drawbar pull of 5,674 pounds at 2.5 miles per hour with 15.89 percent slippage. This tractor will probably not handle the land leveler.

"We investigated the Oliver 900 industrial tractor. This tractor is rated at 63 BHP, and with standard tires 14 x 32 the manufacturer claims a drawbar pull of 7,700 pounds in low gear. I am of the opinion that the drawbar pull can be increased with oversize tires of 18 x 26 and wheel weights. This tractor has not been tested at Nebraska. The local dealers for the Oliver and Bee-Gee lines claim they can pull a DSP-50 with this tractor. The tractor costs approximately $5,800.00 The scraper costs approximately $3,300.00. If the district sees fit to consider this tractor I recommend that it be field tested to see if it will pull the Bee-Gee satisfactorily before purchasing.

"The other wheel-type tractor which would pull the land leveler is the Caterpillar DW-10 tractor. There is also a scraper to match this tractor. This tractor has been tested at Nebraska but the manufacturer claims approximately 14,000 pounds maximum drawbar pull. You will note that this is with loaded scraper which has one end attached to the tractor. When using this tractor with a land leveler it would be necessary to provide a weight box in order to ascertain traction. This tractor sells for approximately $13,000 delivered in Baton Rouge. The scraper sells for approximately $8,300 and $1,250 for the required power unit."

Drainage Studies - E. G. Diseker, Raleigh, North Carolina.-"In the Albemarle District, subsoiling was performed on one plot of Bayboro soil at the Henry Winslow farm near Elizabeth City. The ditch spacing on this plot was 261 feet. The Ferguson tractor and subsoiler was used for this operation. It was necessary to operate the tractor in low gear at full throttle. The depth of subsoiling ranged from 16 to 18 inches, with 42-inch spacing between each middle of newly bedded land. Soil breakage at the bottom of the subsoiled furrow was 6 to 10 inches wide, and it broke the soil on the surface from one middle to the next for a distance of 42 inches. The soil surface was very dry to a depth of 12 inches, and contained numerous clods. Soil moisture below this depth was not sufficient to cause the soil to be plastic.

"The same equipment was used on one plot of newly bedded Elkton silt loam soil at the D. T. Whitehurst farm, near Elizabeth City. The depth of subsoiling ranged from 12 to 16 inches. Even though the tractor was operated in low gear, and at full throttle, it did not have sufficient power for the subsoiler nor would the hydraulic lift maintain the subsoiler at a constant depth. Ditch spacing on this plot was 236 feet. Soil breakage at the bottom of the subsoiled furrows ranged from 5 to 7 inches wide, and averaged about 30 inches width (breakage) at the soil surface. Soil moisture from the surface to a depth of about 8 inches was very low; in fact, as dry as it probably ever occurs. Soil below 8 inches depth was slightly plastic.

"In the Pamlico and Coastal Plains District, subsoiling was performed on one side of a tile main and over two laterals on the Barnhardt farm, near Tarboro. The Ferguson equipment, as described above, was used for this operation at 4- to 5-foot intervals, and was operated in second gear at three-fourths throttle. The

Bladen soil was extremely dry on the surface and did not appear to be plastic at the bottom of the subsoiled furrow at a depth of 18 inches. Soil breakage at the bottom of the furrow was 8 inches, and about 2-1/2 feet horizontally on each side of the subsoiler at the surface."

Drainage Studies - C. B. Gay, Fleming, Georgia.-"During the month of May this section experienced one of the worst droughts it has had in many years. We have had only 0.71 inch of rain which occurred in five light showers. Hot, windy weather followed and, therefore, these showers did the crops no good. The last rain of any consequence was on April 23. Listed below is the rainfall by dates since April 23.

April	23	1.52 inches
	24	.06 "
May	5	.01 "
	11	.13 "
	12	.07 "
	23	.17 "
	26	.33 "

"So far this year our maximum temperature, 94°F, occurred on April 23, and the lowest for May, 45°F., on May 16.

"On May 16 and 17 I made a trip with the Agricultural Agent of the Seaboard Railroad Company observing timberland pastures in Seminole and Coffee Counties, Ga. This was a very informative trip. Many of the farmers in these two counties are demonstrating without question that good grazing can be secured under pine trees. It appeared that the best successes were obtained with Pensacola and Common Bahia along with Crimson and White Clover."

Drainage Studies - T. W. Edminster, Blacksburg, Va.-"Mr. Walter Turner, Soil Scientist, reports that laboratory permeability determinations were run for Sites No. Va-281 thru 285. The typed descriptions in duplicate with the laboratory results in pencil for the above sites and for Sites No. Va-277 thru 280 were submitted for publication.

"Mr. Walker placed major emphasis on the preparation of the paper entitled "Permeability Aspects of Drainage Research in Virginia." This paper is to be presented before the Soil Science Society in Pennsylvania this coming summer.

"During a visit of Mr. Marvin Hoover, Forest Service, Union, S. Car., Mr. Walker discussed with him some of the work that he is doing in conjunction with permeability. Listed below are four objectives which Mr. Hoover made in conjunction with the work:

1. The Forest Service finds it necessary to correct permeability rates for temperature. He does not think this essential where water used for percolating is at a reasonably constant room temperature.

2. The Forest Service takes permeability samples in 2-inch increments from the entire soil profile. He believes this method to be much more accurate than sampling each horizon or subhorizon of the soil profile.

3. The Forest Service has observed that diurnal fluctuations of water tables in deep wells follow an inverse pattern to barometric pressure. In shallow wells, evapotranspiration obscures this effect. Fluctuations attributed to evapotranspiration as large as those noted in Virginia are on record, but not observed during winter months."

Sedimentation Studies - L. M. Glymph, Jr., Lincoln, Nebraska.-"Several items of work received attention during the month:

1. The oven dry weight of corn harvested last fall from the Salt and Hooper Creek floodplain plots was determined and final yield figures were calculated. Discussions were held with the University of Nebraska Soils Department regarding continuation of these studies and arrangements were made with cooperating farmers for work on these fields during the 1951 crop year.

2. Several days were spent developing recommendations for locations of suspended load sampling stations for inclusion in a network of stations being proposed by the Federal Inter-Agency River Basin Sedimentation Subcommittee. This network is for the purpose of determining the suspended--sediment load of representative streams throughout the country.

3. A sedimentation survey was begun on the Sabetha, Kans., municipal water-supply reservoir. This study is being undertaken jointly by Operations and Research in cooperation with the City of Sabetha. This reservoir is about 14 years old and has a drainage area of about 9 square miles. Up to this time only a limited amount of conservation practices has been installed in the watershed. Largely through efforts of the local Work Unit Conservationist, the Nemaha County Agent, and the Sabetha Chamber of Commerce, farmers of the watershed have been organized for group action in installing conservation practices on all of the farms of the watershed. It is planned that progress in application of this watershed program will be followed in the future and repeat surveys made on the reservoir periodically to determine its effects upon the rate of sediment production."

Sedimentation Studies - R. Woodburn, State College, Mississippi.-"Studies on the bare plot soil losses at State College were continued during the month.

"Data on 'effective' amount of rain, 10 minutes intensity, and 30-minute intensity and effective average intensity together with accompanying soil loss were worked out for each rain.

"A statistical study is planned to correlate all of these rain characteristics with erosion from the yardstick plot. The apparent correlation, rain by rain, seems good. When yearly figures are used, the results are not so favorable.

"We are wondering, however, how we can carry the results of this State College runoff plot study to the Yazoo Watershed where only annual amounts of rain are available and possibly some intensity figures.

"Mr. R. Y. Bailey visited with us during the month for a discussion of the operation of project MS-R-1. Plans were made for him to return in July for a full week of conference on field problems in sedimentation. Mr. Bailey was taken to the

office of Dr. Frank J. Welch, Experiment Station Director, for the purpose of wishing Dr. Welch well in his new assignment as Director of Agricultural Services and Dean of School of Agriculture, University of Kentucky.

"A call was also made on Dr. Clay Lyle, Director to be of Agricultural Services and Dean of Agriculture.

"The month was generally dry and there were no records of importance on water surface slope on Thompson Creek in Carroll county.

"Mr. Burford completed the re-examination of the sedimentation data using the best revised figures available for calculation of correlation coefficients and regression coefficients between reservoir sediment, watershed area, reservoir age, gross erosion rate, and capacity watershed ratio."

IRRIGATION AND WATER CONSERVATION DIVISION

Drainage Investigations, Imperial Valley, California - G. B. Bradshaw, Imperial, California.-"During the past 8 years the Imperial Irrigation District has maintained records on the salt balance in Imperial Valley. Periodic samples were taken from the All-American Canal and the wasteways in conjunction with metering the water. The total quantity of dissolved salts entering the valley in the irrigation water and the salts being discharged into the Salton Sea was computed from the chemical analysis and the related volumes of irrigation and drainage waters.

"Conditions for the 8 years, 1943-50, inclusive, are summarized in table 1. The last column, 'Ratio between in-flow and outflow of saline elements' shows the salt balance for the years 1949 and 1950 was more favorable than any of the previous years. The favorable ratio of 105.30 percent for 1949 and 104.93 percent for 1950 is attributed to an increase in reclamation of saline soils by tile drainage and leaching.

"With the increase of tiled acreages and the increase in acres being leached a greater amount of salt was removed from the land and discharged into Salton Sea. It is interesting to note that the reduction of land being leached during 1950, 1,635 acres or about 8 percent less than 1949, reflects a corresponding reduction in the percentage of salt being removed from the land by the open and closed drains as is shown in table 1. The total acreage of 18,356 acres leached during 1950 was on 204 farms which ranged in size from 640 acres down to 2 acres."

Table 1.--Imperial Valley, Calif., salt balance, 1943-50

Year	Salt entering the Imperial Valley in the irrigation water	Salt leaving the Imperial Valley in the drainage water	Ratio between inflow and outflow of saline elements	Installation of tile drainage	Total acres leached
	Tons	Tons	Percent	Acres	Acres
1943	2,157,203	1,997,390	92.59	3,141	4,027
1944	2,554,432	2,242,920	87.80	3,214	6,531
1945	2,563,579	2,400,629	93.64	3,269	8,888
1946	2,907,275	2,395,904	82.41	5,480	10,637
1947	2,799,511	2,440,809	87.19	17,920	8,885
1948	2,744,146	2,630,608	95.86	17,220	10,787
1949	2,659,119	2,800,165	105.30	21,670	20,000
1950	2,793,780	2,931,431	104.93	22,610	18,356
Total				115,140	

Snow Surveys and Irrigation Water Supply Forecasts - H. J. Stockwell, Ft. Collins, Colorado.-"The water-supply outlook is above normal for the Green, North Platte, Laramie, South Platte, Upper Arkansas, Upper Colorado, White, and Yampa Rivers. Near normal stream flow is expected on the Gunnison River, Snow cover was deficient throughout the winter months on the Rio Grande, San Juan, Dolores, and southern tributaries to the Arkansas Rivers. The water-supply outlook in New Mexico is critically poor and crop curtailment has been necessary.

"High peak flows may be expected on the South Platte tributaries. Stream flow is generally above normal at the end of May after a long period of below normal flow. Damaging peak flows on this watershed are still a possibility depending on the amount of rainfall at the time of peak melting. If the rainfall is normal or less, damage should be slight."

Irrigation Studies - A. R. Codd, Bozeman, Montana.-"The final work on the revision of the over-snow vehicle, known as the Montana Snow Bug was completed under the sponsorship of the Montana Agricultural Experimental Station. The first trial run was made on May 5 at the head of Gallatin Canyon. A second trial was made on May 16 in the presence of George D. Clyde, Chief Division Irrigation and Lincoln F. Gallagher Administrative Assistant from the Logan, Utah, office of Soil Conservation Research. The results of these trials definitely indicate that the track mechanism has been improved and the old trouble of loose chains and cast iron sproket breakage during a slight side slip have been overcome with the new roller chain and steel sprokets. The new 'Z' bar chain track built into side trusses with ridged mounts for the rear bearing and adjustable bearings on the front have proven a very worth-while improvement. The present machine will climb a 43 percent hill with three persons aboard and also will traverse this 43 percent hill or slope in continuous motion with very little side slip. The machine will turn in a 20-foot diameter circle and steered fairly well considering the loose non-packing 'Corn Snow' in which the trials were made. On the level the machine will travel at 8 miles per hour in high gear. This over-snow vehicle is virtually a power driven toboggan 3'x6' with a front pilot pontoon for steering. The entire machine weighs 800 pounds. The bearing surface of the main pontoon is 2,475/inches sq. and the pilot pontoon bearing surface is 1,536 square inches. The sled is powered by a 10 horse power twin cylinder Ownan (Fairbanks) gasoline motor, has a Ball-Lock Clutch and a transmission with three speeds forward and one reverse. The features of the machine are: sliding pontoon with grouser traction, small bulk and light weight, floats on light powder snow, transportation to snow is made by standard pick-up truck. Two men can manhandle when and if necessary, low investment cost ($860) for services received, small operating cost and standard replacement parts. The mechanical dependability of the machine will have to be determined this coming season and should not be rated too low on this experimental model."

Irrigation Studies - P. E. Ross, Weslaco, Texas.-"One day was spent with Zone Conservationist M. H. Hortman from the Regional Office. Drainage was the chief subject of discussion. Saline areas over the entire Lower Rio Grande Valley are more pronounced this spring than any time during the past 6 years. The general consensus is that shortage of both irrigation water and rainfall has been acute enough to reduce leaching of soluble salts to a minimum. Salinity near the surface has increased due to lack of downward movement of water in the soil. Operations personnel continue to receive many requests for assistance on drainage."

Irrigation Studies - K. Harris and H. B. Peterson, Phoenix, Arizona.- "There were noted on many cotton fields in the Valley parallel tracts running diagonally across the field. Upon investigation, it was found that these tracts were made by rubber-tired tractors in preparing the seed bed. Cotton failed to come up in these tracted areas. Measurements showed that there was 39 percent of the land compacted in pulling a drag diagonally across the field. Pentrometer readings showed:

Rear wheel	29.7
Front wheel	25.9
Between wheels	23.4

"While driving by a barley field, wheel tracks were noted in the center of the field. This field had been in vegetables for the last 2 years and the tracks were made by vegetable trucks. Uhland core samples were taken in the tracked area, and out of it. The following data show the rubber tires compacted the soil down to about 12 inches.

Depth below surface (in inches)	Infiltration rate (In/hr.) Tracked area	Not tracked area	Apparent specific gravity Tracked area	Not tracked area
0-3	0.092	0.274	1.41	1.39
6-9	.071	.351	1.48	1.40
12-15	.260	.253	1.40	1.35

"The grain in the tracked area was about half as high as was the other grain.

"An irrigation experiment on cotton has been started at the University of Arizona Farm at Mesa. Because there is very often a serious water shortage in the State, this experiment was set up to see what yields could be attained on minimum amounts of water, and try to determine the most advantageous time of application. Half the borders were flood-irrigated and planted in a moist seedbed the other half were bedded dry, planted dry, and irrigated. All borders received 50 lbs. of ammonium nitrate per border."

Surface and Sprinkler Irrigation Studies - W. D. Criddle, Boise, Idaho.- "Last year it was decided to attempt to measure the change in intake rate which could be produced by applying gypsum to slick spot areas on the experimental tract. A particularly bad slick spot area was chosen and three duplicate sets of 18-inch rings were driven into the soil to a depth of about 4 or 5 inches. Gypsum was added to the soil in one set of rings at the rate of 20 tons per acre and spaded into the soil to a depth of about 4 inches. Gypsum was applied at the rate of 10 tons per acre in the second set, and the third set of rings was used as a check. Intake tests just completed show that the rings receiving 20 tons of gypsum per acre took water approximately 12 times as fast as the check rings, and the rings having 10 tons per acre application of gypsum took water more than 4 times as fast as the check plot. Of particular interest was the appearance of the soil in these rings prior to applying water this spring. In the check rings the soil had very little structure and the surface had slicked over and run together similar to the area surrounding the rings. The soil receiving 10 tons per acre of gypsum showed many cracks and a much improved structure condition. The soil within the rings which received 20 tons per acre of gypsum showed considerable fluffing and cracking open, and from general appearance would indicate a much more rapid intake than the untreated soil."

Irrigation Studies - S. J. Mech, Prosser, Washington.-"Observations to date show very striking detrimental effects from too early irrigation on wheat. Our poorest wheat is on the wet plots. The irrigation in mid-April stunted its growth and caused yellowing of foliage. This stunting is still evident though it is being obliterated by the more vigorous growth between the furrows. Irrigation on the medium plots produced the same stripped effect but to a lesser degree.

"The wheat is now more than a foot high and is beginning to head out. It will be interesting to watch the effect of first irrigation on the dry plots. Our experience lends support to the general caution -- "keep irrigation water away from wheat until it begins to joint."

7/20/51